Old claims

1. Resolution filter (4) for a spectrum analyser (1), **characterised in that** the resolution filter (4) has the following complex, discrete impulse response $h_{used}(k)$:

$$h_{used}(k) = C_1 \cdot \left[e^{-C_2 T_a^2 \cdot k^2} * h_{allp}(t)\right] \cdot e^{-jC_3 (k-k_0)^2 \cdot T_a^2}$$

wherein C_1, C_2 and C_3 are constants, k is the sampling index and T_a is the sampling period, wherein $h_{allp}(t)$ is the Fourier re-transform of $e^{j\varphi(f)}$, wherein $\varphi(f)$ is a random phase response dependent upon the frequency of the transmission function of the resolution filter and wherein k_0 is a free variation parameter.

2. Resolution filter according to claim 1, **characterised in that** the variation parameter k_0 is set in such a manner that the frequency overshoot determined by the group delay of the resolution filter (4) is compensated.

3. Resolution filter according to claim 1 or 2, **characterised in that** the variation parameter k_0 is set in such a manner that the middle of the frequency response $H_{used}(f)$ of the resolution filter is disposed at the frequency origin at the frequency f=0.

4. Resolution filter according to any one of claims 1 to 3, **characterised in that**

$\varphi(f)$ and therefore also $h_{allp}(t)$ are selected in such a manner that a minimal-phase resolution filter is formed.

5. Resolution filter (4) according to any one of claims 1 to 4,

characterised in that

the value of the constant C_1 is

$$C_1 = \sqrt{\frac{\pi}{2\ln(2)}} \cdot B_{res} \cdot T_a$$

wherein B_{res} is the bandwidth of the resolution filter (4).

6. Resolution filter (4) according to any one of claims 1 to 5,

characterised in that

the value of the constant C_2 is

$$C_2 = \frac{\pi^2}{2\ln(2)} \cdot \frac{1}{T_{res}^{\ 2}}$$

wherein, $T_{res} = 1/B_{res}$ is the reciprocal bandwidth B_{res} of the resolution filter (4).

7. Resolution filter (4) according to any one of claims 1 to 6,

characterised in that

the value of the constant C_3 is

$$C_3 = \frac{\pi}{K} \cdot B_{res}^{\ 2}$$

wherein B_{res} is the bandwidth of the resolution filter (4) and K is the K-factor of the resolution filter (4), wherein the K-factor is defined via the equation:

$$f(t) = \frac{1}{K} \cdot {B_{res}}^2 \cdot t$$

and f(t) is a frequency variable with time t in a linear manner, which is supplied to a mixer (3) of the spectrum analyser (1) connected upstream of the resolution filter (4).

8. Spectrum analyser for analysing the spectrum of an input signal with a resolution filter (4) specifying the frequency resolution,

characterised in that

the resolution filter (4) has the following complex, discrete impulse response $h_{used}(k)$:

$$h_{used}(k) = C_1 \cdot \left[e^{-C_2 T_a^2 \cdot k^2} * h_{allp}(t)\right] \cdot e^{-jC_3 (k-k_0)^2 \cdot T_a^2}$$

wherein C_1, C_2 and C_3 are constants, k is the sampling index and T_a is the sampling period,

wherein $h_{allp}(t)$ is the Fourier re-transform of $e^{j\varphi(f)}$, in which $\varphi(f)$ is a random phase response dependent upon the frequency in the transmission function of the resolution filter and

wherein k_0 is a free variation parameter.

9. Spectrum analyser according to claim 8,

characterised in that

the variation parameter k_0 is set in such a manner that the frequency overshoot determined by the group delay of the resolution filter (4) is compensated.

10. Spectrum analyser according to claim 8 or 9,
characterised in that
the variation parameter k_0 is set in such a manner that the middle of the frequency response $H_{used}(f)$ of the resolution filter is disposed at the frequency origin at the frequency f=0.

11. Spectrum analyser according to any one of claims 8 to 10,
characterised in that
$\varphi(f)$ and therefore also $h_{allp}(t)$ are selected in such a manner that a minimal-phase resolution filter is formed.

Annex to IPER

Translation of PCT/EP2004/012809

New claims

1. Resolution filter (4) for a spectrum analyser (1), wherein the resolution filter (4) has the following complex, discrete impulse response $h_{used}(k)$:

$$h_{used}(k) = C_1 \cdot \left[e^{-C_2 T_a{}^2 \cdot k^2} * h_{allp}(t)\right] \cdot e^{-jC_3 (k-k_0)^2 \cdot T_a{}^2}$$

wherein C_1, C_2 and C_3 are constants, k is the sampling index and T_a is the sampling period, wherein $h_{allp}(t)$ is the Fourier retransform of $e^{j\varphi(f)}$, in which $\varphi(f)$ is a randomly-specified phase response dependent upon the frequency of the transmission function of the resolution filter, wherein k_0 is a free variation parameter and wherein the variation parameter k_0 is set in such a manner that the frequency overshoot determined by the group delay of the resolution filter (4) is compensated.

2. Resolution filter according to claim 1, **characterised in that** the variation parameter k_0 is set in such a manner that the middle of the frequency response $H_{used}(f)$ of the resolution filter is disposed at the frequency origin at the frequency f=0.

3. Resolution filter according to any one of claims 1 or 2,
characterised in that

$\varphi(f)$ and therefore also $h_{allp}(t)$ are selected in such a manner that a minimal-phase resolution filter is formed.

4. Resolution filter (4) according to any one of claims 1 to 3,
characterised in that
the value of the constant C_1 is:

$$C_1 = \sqrt{\frac{\pi}{2\ln(2)}} \cdot B_{res} \cdot T_a$$

wherein B_{res} is the bandwidth of the resolution filter (4).

5. Resolution filter (4) according to any one of claims 1 to 4,
characterised in that
the value of the constant C_2 is

$$C_2 = \frac{\pi^2}{2\ln(2)} \cdot \frac{1}{T_{res}^{\;2}},$$

wherein $T_{res} = 1/B_{res}$ is the reciprocal bandwidth B_{res} of the resolution filter (4).

6. Resolution filter (4) according to any one of claims 1 to 5,
characterised in that
the value of the constant C_3 is

$$C_3 = \frac{\pi}{K} \cdot B_{res}^{\;2} ,$$

wherein B_{res} is the bandwidth of the resolution filter (4) and K is the K-factor of the resolution filter (4), wherein the K-factor is defined via the equation:

$$f(t) = \frac{1}{K} \cdot B_{res}^{\;2} \cdot t$$

and f(t) is a frequency variable with time t in a linear manner, which is supplied to a mixer (3) of the spectrum analyser (1) connected upstream of the resolution filter (4).

7. Spectrum analyser for analysing the spectrum of an input signal with a resolution filter (4) specifying the frequency resolution, wherein the resolution filter (4) has the following complex, discrete impulse response $h_{used}(k)$:

$$h_{used}(k) = C_1 \cdot \left[e^{-C_2 T_a^{\,2} \cdot k^2} * h_{allp}(t) \right] \cdot e^{-jC_3 (k-k_0)^2 \cdot T_a^{\,2}}$$

wherein C_1, C_2 and C_3 are constants, k is the sampling index and T_a is the sampling period, wherein $h_{allp}(t)$ is the Fourier retransform of $e^{j\varphi(f)}$, in which $\varphi(f)$ is a randomly-specified phase response dependent upon the frequency of the transmission function of the resolution filter, wherein k_0 is a free variation parameter and

wherein the variation parameter k_0 is set in such a manner that the frequency overshoot determined by the group delay of the resolution filter (4) is compensated.

8. Spectrum analyser according to claim 7,
characterised in that
the variation parameter k_0 is set in such a manner that the middle of the frequency response $H_{used}(f)$ of the resolution filter is disposed at the frequency origin at the frequency $f=0$.

9. Spectrum analyser according to any one of claims 7 or 8,
characterised in that
$\varphi(f)$ and therefore also $h_{allp}(t)$ are selected in such a manner that a minimal-phase resolution filter is formed.